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European Technical Assessment

ETA-24/0058 of 30.06.2025

General part

Technical Assessment Body issuing the European Technical Assessment	Österreichisches Institut für Bautechnik (OIB) Austrian Institute of Construction Engineering
Trade name of the construction product	SHARP METAL
Product family to which the construction product belongs	Three-dimensional nailing plate
Manufacturer	Rotho Blass srl Via Dell'Adige 2/1 39040 Cortaccia (BZ) ITALY
Manufacturing plants	X2 – X3 – X4
This European Technical Assessment contains	16 pages including 3 annexes which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	European Assessment Document (EAD) 130186-00-0603 "Three-dimensional nailing plates".

Specific parts

1 Technical description of the product

1.1 General

This European Technical Assessment (ETA) applies to the connector SHARP-METAL to be used in load-bearing timber to timber connections. SHARP-METAL consists of a metal sheet with staggered arranged protruding teeth on both sides installed into the timber with self-tapping screws (possibly including washers) with diameter d = 8 mm. SHARP METAL is produced in width B = 50 mm and with varying length 100 mm ≤ L ≤ 1200 mm.

SHARP-METAL corresponds to the specifications given in Annex 1. The material characteristics, dimensions and tolerances of SHARP-METAL, not indicated in these Annexes, are given in the technical file[1] of the European Technical Assessment.

1.2 Components

1.2.1 Metal sheet

The metal sheet together with its most important dimensions are shown in Annex 1. The thickness of the metal sheet is 0,75 mm and staggered arranged protruding teeth of length 1,8 mm (1,25 x 1,8 x 0,85 mm) are scratched from the metal sheet surface.

The metal sheet is produced of

- carbon steel S355 according to EN 10025-2[2] or equivalent, or
- aluminium EN AW-5052 according to EN 755-2[3], or
- stainless steel 1.4512 or 1.4310 according to EN 10088-2[4].

1.2.2 Screws and washer

The screws for the for installation of the metal sheet into the timber are self-tapping screws with partial thread of diameter d = 8 mm and minimum threaded length 80 mm in accordance with ETA-11/0030[5], Annex A.07a and A.07b:

- Thread tip types RBN, RBN2 or RBH.
- Head types CS, LW1, LW2 or LW3.

Screws with washer head shall be used or washers may be installed separately.

Screws and washers are made of carbon steel.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

2.1 Intended use

SHARP METAL is intended to be used in load bearing shear connections between softwood members as side grain to side grain or end grain to end grain connections, e.g. between beams. SHARP METAL can only transfer loads parallel to one shear plane.

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1 The technical file of the European Technical Assessment is deposited at Österreichisches Institut für Bautechnik and, in so far as is relevant to the tasks of the notified factory production control certification body involved in the assessment and verification of constancy of performance procedure, is handed over to the notified factory production control certification body.

2 EN 10025-2:2019

3 EN 755-2:2016

4 EN 10088-2:2024

5 ETA-11/0030 of 30.09.2024 for “Rotho Blaas - Self-tapping screws and threaded rods”

SHARP METAL is intended to be used in the following softwood members:

Groups and Subgroups			Product	Abbreviation	hEN or EAD
Solid wood-based (SWB)		Structural timber (ST)	Strength-graded structural timber made of softwood	ST-c	EN 14081-1[6], EN 1912[7]
			Glued structural timber made of softwood	GST	EN 14080[8]
		Parallel. laminated timber (PL)	Glued laminated timber made of softwoods	GLT-c	EN 14080
			Block-glued glulam made of softwood	BGLT	EN 14080
			Single layered solid wood panel made of softwood	SWP-P	EN 13353[9]
		Cross laminated timber (CL)	Cross laminated timber made of softwood	CLT	EAD 130005-00-0304
			Multi-layered solid wood panel made of softwood	SWP-C	EN 13353
Veneer-based (VB)	Laminated Veneer Lumber (LVL)	LVL-P	Softwood LVL with parallel veneers	LVL-P-c	EN 14374[10]
		LVL-C	Softwood LVL with crossband veneers	LVL-C-c	EN 14374
			Softwood glued LVL with crossband veneers	GLVL-C-c	acc. to ETA
	PLY		Softwood plywood	PLY-c	EN 13986[11] and EN 636[12]

The minimum strength class for solid timber is C24 according to EN 338[13], and the material shall be free of pith to reduce swelling and shrinkage effects.

The minimum thickness of the timber members is 60 mm.

The typical installation of SHARP METAL is shown in Annex 2.

SHARP METAL shall be subjected to static and quasi-static actions only.

SHARP METAL is intended to be used in service classes 1 and 2 according to EN 1995-1-1[14].

6 EN 14081-1:2016+A1:2019
7 EN 1912:2024
8 EN 14080:2013
9 EN 13353:2022
10 EN 14374:2004
11 EN 13986:2004+A1:2015
12 EN 636:2012+A1:2015
13 EN 338:2016
14 EN 1995-1-1:2004 +AC:2006 +A1:2008 +A2:2014

2.2 General assumptions

SHARP METAL is manufactured in accordance with the provisions of the European Technical Assessment using the manufacturing process as identified in the inspection of the manufacturing plant by Österreichisches Institut für Bautechnik and laid down in the technical file.

The manufacturer shall ensure that the requirements in accordance with the Clauses 1, 2 and 3 as well as with the Annexes of the European Technical Assessment are made known to those who are concerned with planning and execution of the works.

Design

The European Technical Assessment only applies to the manufacture and use of SHARP METAL. Verification of stability of the works including application of loads on the products is not subject to the European Technical Assessment.

The following conditions shall be observed:

- Design of connections with SHARP METAL is carried out under the responsibility of an engineer experienced in timber structures.
- Design of the works shall account for the protection of SHARP METAL to maintain service class 1 or 2 according to EN 1995-1-1.
- SHARP METAL is installed correctly.

Design of connections with SHARP METAL may be according to EN 1995-1-1 and EN 1995-1-2[15] taking into account the Annexes of the European Technical Assessment. Standards and regulations in force at the place of use shall be considered.

Standards and regulations in force at the place of use shall be considered.

Packaging, transport, storage, maintenance, replacement and repair

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

Installation

It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

The beam hangers shall be screwed as specified in Annex 2. A minimum of two screws shall be used together with SHARP METAL. In general, the screws shall be arranged staggered.

The structural members which are connected with SHARP METAL shall be

- wood-based members according to clause 2.1;
- free from wane under the connector;
- with plane surfaces against the connector; and
- without virtually gap between the timber members (less than 1,00 mm).

The minimum spacing and edge distances are in accordance with EN 1995-1-1 or European Technical Assessment.

To ensure a proper penetration of the teeth of SHARP METAL a minimum compression force of 1,15 MPa (referring to a characteristic timber density of 480 kg/m³) is necessary.

[15] EN 1995-1-2:2004 + AC:2006 + AC:2009

Installation of SHARP METAL into timber members with a characteristic density ≤ 450 kg/m³ may be performed using partially threaded screws with d=8 mm and a washer head type HBS+HUS, TBS or TBSMAX with a length of the threaded part of at least 100 mm and a maximum distance of the screws $a_1 \leq 12{,}5 \cdot d$. Proper penetration of the teeth must be ensured. The screws can be driven directly through the SHARP-METAL without any pre-drilling.

2.3 Assumed working life

The provisions made in the European Technical Assessment (ETA) are based on an assumed intended working life of SHARP METAL of 50 years, when installed in the works, provided that SHARP METAL is subject to appropriate installation, use and maintenance (see Clause 2.2). These provisions are based upon the current state of the art and the available knowledge and experience[16].

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA nor by the Technical Assessment Body, but are regarded only as a means for choosing the appropriate products in relation to the expected economically reasonable working life of the works.

[16] The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, and the particular conditions of the design, execution, use and maintenance of that works may be outside this ETA. Therefore, it cannot be excluded that in these cases the real working life of the product may also be shorter than the assumed working life.

3 Performance of the product and references to the methods used for its assessment

3.1 Performance of the product

Table 1: Performance of the product in relation to the essential characteristics

№	Essential characteristic	Product performance
Basic requirement for construction works 1: Mechanical resistance and stability		
1	Joint strength	3.1.1
2	Joint stiffness	3.1.2
3	Joint ductility	No performance assessed.
4	Resistance to seismic actions	No performance assessed.
5	Resistance to corrosion and deterioration	3.1.3
Basic requirement for construction works 2: Safety in case of fire		
6	Reaction to fire	3.1.4
7	Resistance to fire	No performance assessed.

3.1.1 Joint strength

The characteristic load bearing capacities of the connectors are determined by testing. The connectors are installed with a defined number of screws with respective nominal diameter as specified in Annex 2.

The values of the characteristic load bearing capacities are given in Annex 3.

3.1.2 Joint stiffness

The stiffness of the connectors was determined by testing. The connectors are installed with a defined number of screws with respective nominal diameter as specified in Annex 2.

The stiffness values are given in Annex 3.

3.1.3 Resistance to corrosion and deterioration

The product is intended to be used in service classes 1 and 2 according to EN 1995-1-1. The product and each member of the connection should at least be suitable for service classes 1 and 2, but not for service class 1 only.

The metal sheets of carbon steel are made of S355 or equivalent according to EN 10025-2 and electrogalvanized and yellow or blue passivated or hot-dip galvanised. The minimum thickness of the zinc coating is 12 µm.

The metal sheets of aluminium are made of EN AW-5052 according to EN 755-2 applicable in durability class A according to EN 1999-1-1.

The metal sheets of stainless steel are made of steel 1.4512 or 1.4310 according to EN 10088-2 applicable in corrosion resistance class I (1.4512) or II (1.4310) according to EN 1993-1-4[17].

Screws and washers are made of carbon steel and galvanised.

[17] EN 1993-1-4:2006 + A1:2005 + A2:2020

3.1.4 Reaction to fire

Steel sheets are made of carbon steel, aluminium or stainless steel and the screws and washers are made of carbon steel, all classified as Euroclass A1 in accordance with Commission Decision 96/603/EC as amended.

3.2 Assessment methods

3.2.1 General

The assessment of the essential characteristics in Clause 3.1 of SHARP METAL for the intended use, and in relation to the requirements for mechanical resistance and stability and for safety in case of fire in the sense of the basic requirements for construction works № 1 and 2 of Regulation (EU) № 305/2011 has been made in accordance with the European Assessment Document EAD 130186-00-0603 “Three-dimensional nailing plates”.

3.2.2 Identification

The European Technical Assessment for SHARP METAL is issued on the basis of agreed data that identify the assessed product. Changes to materials, to composition, to characteristics of the product, or to the production process could result in these deposited data being incorrect. Österreichisches Institut für Bautechnik should be notified before the changes are implemented, as an amendment of the European Technical Assessment is possibly necessary.

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

4.1 System of assessment and verification of constancy of performance

According to Commission Decision 97/176/EC[18], as amended, the system of assessment and verification of constancy of performance to be applied to SHARP METAL is System 2+. System 2+ is detailed in Commission Delegated Regulation (EU) № 568/2014[19] of 18 February 2014, Annex, 1.3., and provides for the following items

(a) the manufacturer shall carry out:

  (i) an assessment of the performance of the construction product carried out on the basis of testing (including sampling), calculation, tabulated values or descriptive documentation of the product;

  (ii) factory production control;

  (iii) further testing of samples taken at the manufacturing plant by the manufacturer in accordance with a prescribed test plan[20];

(b) the notified factory production control certification body shall decide on the issuing, restriction, suspension or withdrawal of the certificate of constancy of performance of the construction product on the basis of the outcome of the following assessments and verifications carried out by that body:

  (i) initial inspection of the manufacturing plant and of factory production control;

  (ii) continuous surveillance, assessment and evaluation of factory production control.

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[18] Official Journal of the European Communities OJ L 073, 14.3.1997, p. 19

[19] Official Journal of the European Communities OJ L 157, 27.5.2014, p. 76

[20] The prescribed test plan has been deposited with Österreichisches Institut für Bautechnik and is handed over only to the notified factory production control certification body involved in the procedure for the assessment and verification of constancy of performance. The prescribed test plan is also referred to as control plan.

4.2 Construction products for which a European Technical Assessment has been issued

Manufacturer undertaking tasks under System 2+ shall consider the European Technical Assessment issued for the construction product in question as the assessment of the performance of that product. Manufacturers shall therefore not undertake the tasks referred to in point 4.1 (a)(i).

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

5.1 Task for the manufacturer

5.1.1 Factory production control

In the manufacturing plant the manufacturer establishes and continuously maintains a factory production control. All data, procedures, and specifications adopted by the manufacturer are documented in a systematic manner in the form of instructions manual (user's guides) and process instructions. Purpose of factory production control is to ensure the constancy of performances of the product with regard to the essential characteristics.

The manufacturer only uses raw materials supplied with the relevant inspection documents as laid down in the control plan. The incoming raw materials are subjected to controls by the manufacturer before acceptance. Check of incoming materials includes control of inspection documents presented by the manufacturer of the raw materials.

The frequency of control and testing performed within factory production control as well as on the finished product, is in accordance with the determined manufacturing process and the prescribed test plan. The factory production control's results of testing are recorded and evaluated. The records are kept at least for ten years after the product has been placed on the market and are presented to the notified factory production control certification body involved in continuous surveillance. On request the records are presented to Österreichisches Institut für Bautechnik. The records shall include at least:

- Designation of the product, the materials and components
- Type of control and testing
- Date of manufacture of the product and the date of inspection of the product, materials or components
- Results of control and examination and, if applicable, comparison with requirements
- Name and signature of person responsible for factory production control

If test results are unsatisfactory, the manufacturer immediately implements measures to eliminate the defects. Products or components that are not in conformity with the requirements are removed. After elimination of the defects, the respective test – if verification is required for technical reasons – is repeated immediately.

5.1.2 Declaration of performance

The manufacturer is responsible for preparing the declaration of performance. When all the criteria of the assessment and verification of constancy of performance are met, including the certificate of conformity issued by the notified factory production control certification body, the manufacturer shall draw up a declaration of performance.

5.2 Tasks for the notified factory production control certification body

5.2.1 Initial inspection of the manufacturing plant and of factory production control

The notified factory production control certification body shall verify the ability of the manufacturer for a continuous and orderly manufacturing of SHARP METAL according to the European Technical Assessment. In particular the following items shall be appropriately considered

- Personnel and equipment
- The suitability of the factory production control established by the manufacturer
- Full implementation of the control plan

5.2.2 Continuous surveillance, assessment and evaluation of factory production control

The notified factory production control certification body shall visit the factory at least once a year for routine inspection. In particular the following items shall be appropriately considered

- The manufacturing process including personnel and equipment
- The factory production control
- The implementation of the control plan

The results of continuous surveillance are made available on demand by the notified factory production control certification body to Österreichisches Institut für Bautechnik. When the provisions of the European Technical Assessment and the control plan are no longer fulfilled, the certificate of conformity of the factory production control is withdrawn by the notified factory production control certification body.

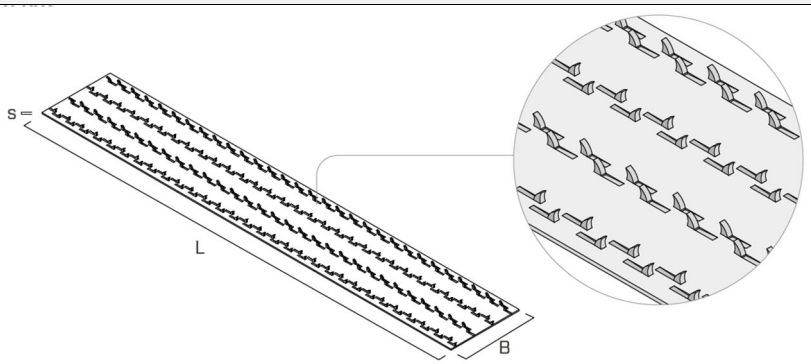
Issued in Vienna on 30.06.2025
by Österreichisches Institut für Bautechnik

The original document is signed by:

Thomas Rockenschaub
Managing Director

SHARP METAL - Geometry and materials

Geometry



Materials and coatings

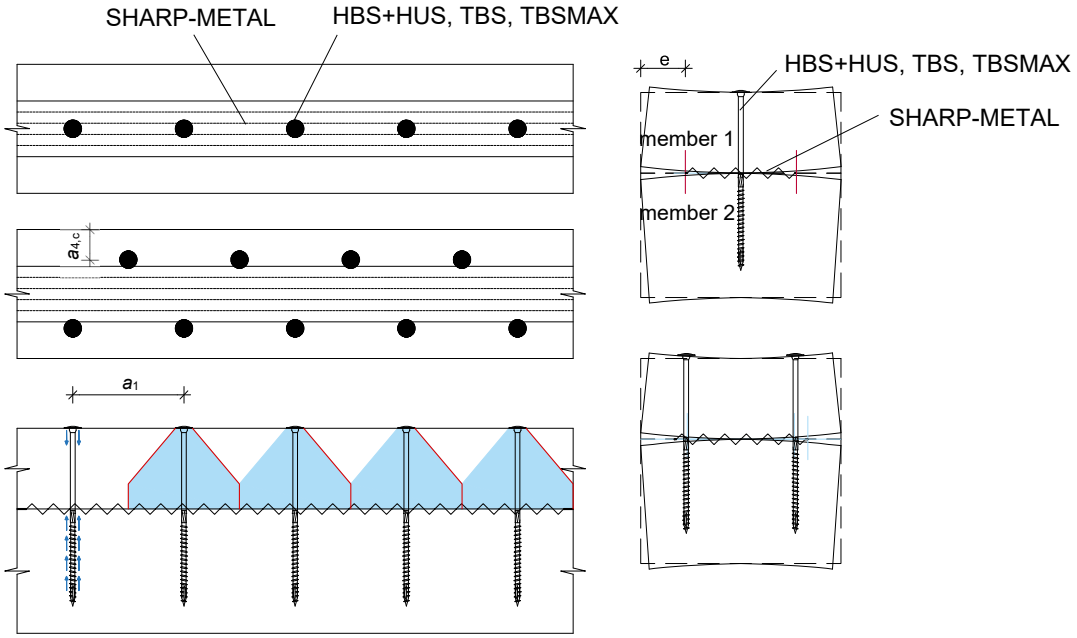
- Carbon Steel, electrogalvanized and yellow or blue passivated or hot-dip galvanised. The minimum thickness of the zinc coating is 12 µm.
- Aluminium
- Stainless steel

Nominal dimensions		SHARP-METAL
B	Width	50,00
	Allowed deviation	± 0,75
S	Thickness stripes	0,75
	Allowed deviation	± 0,15
t_h	Height of the teeth	1,80
	Allowed deviation	± 0,35
b_h	Width of the teeth	1,25
	Allowed deviation	± 0,25

Length	Standard length
L	Allowed Deviations $l_{s,min/max}$
100	l_s ± 3,00
200	l_s ± 3,00
400	l_s ± 3,00
600	l_s ± 3,50
800	l_s ± 3,50
1000	l_s ± 3,50
1200 or longer	l_s ± 3,50
in steps of 200 mm	

All sizes in [mm]

SHARP METAL – Typical installation



$a_{4,c}$ minimum distance to the unloaded edge of the screw

Figure A2.1: Installation of SHARP METAL, screws arranged staggered or in one row

$$e = \max \begin{cases} \frac{b}{6} \\ 25 \text{ mm} \end{cases}$$

e distance of the SHARP METAL to the edge of the timber member

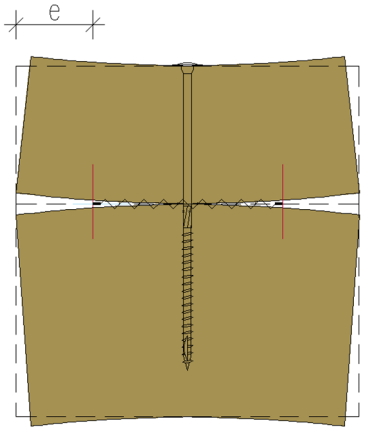


Figure A2.2: Minimum end- and edge distance e of SHARP METAL

The minimum penetration length of the threaded part of the screw (including tip) is

$$l_{ef} = \min \begin{cases} \frac{4 \cdot d}{\sin \alpha} \\ 20 \cdot d \end{cases}$$

with α as the angle between the screw axis and the grain direction of the timber members.

SHARP METAL Typical installation of SHARP METAL	**Annex 2** of ETA-24/0058 of 30.06.2025

SHARP METAL – Typical applications

Figure A2.3 shows typical applications for SHARP METAL in mechanically jointed beams.

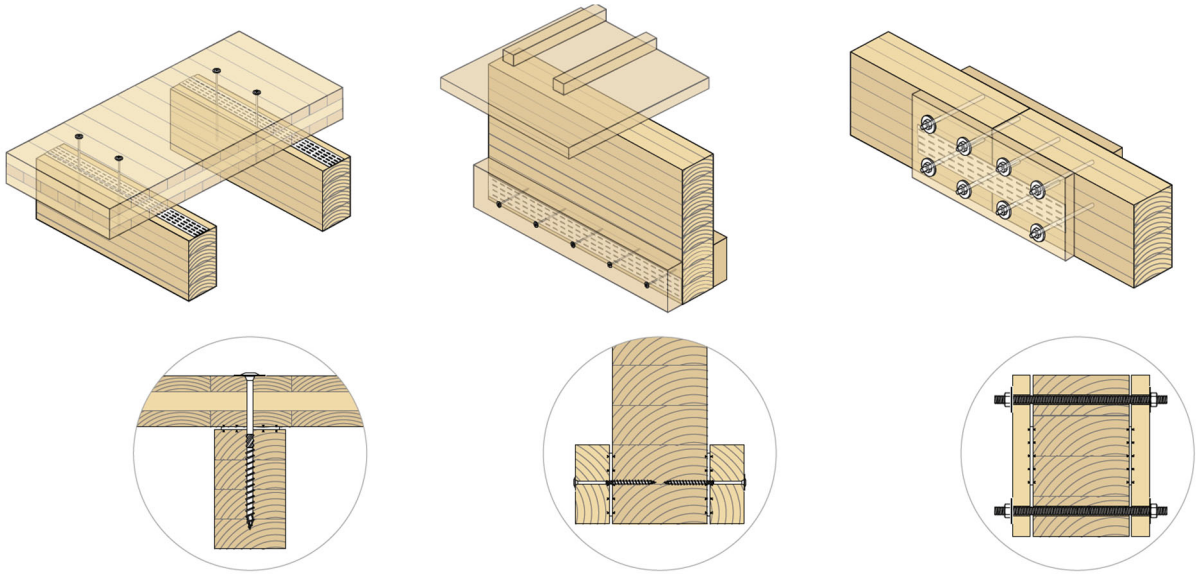


Figure A2.3: Examples for typical applications of SHARP METAL in mechanically jointed beams

SHARP METAL Typical installation of SHARP METAL	**Annex 2** of ETA-24/0058 of 30.06.2025

SHARP METAL - Definition of forces and their directions

Figure A2.4 shows different installation planes of the SHARP METAL in the side grain and end grain of a timber member.

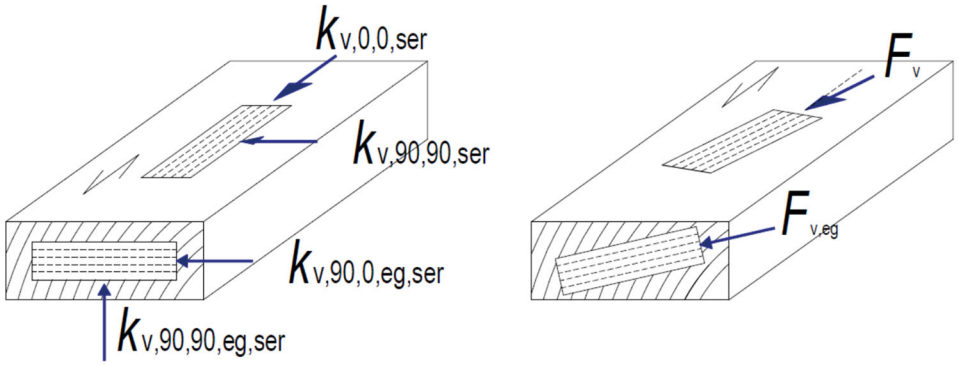


Figure A2.4: Definition of forces and their directions

SHARP METAL Typical installation of SHARP METAL	**Annex 2** of ETA-24/0058 of 30.06.2025

Load-bearing capacity in shear $F_{v,Rk}$

The characteristic load-bearing capacity in shear for a SHARP METAL connection arranged at the side grain shall be calculated as

$$F_{v,Rk} = b \cdot l_{ef} \cdot f_{v,ref,k} \cdot \left(\frac{\rho_k}{\rho_{ref,k}} \right)^{0,5}$$

The characteristic load-bearing capacity in shear for a SHARP METAL connection arranged at the end grain shall be calculated as

$$F_{v,eg,Rk} = b \cdot l_{ef} \cdot f_{v,eg,ref,k} \cdot \left(\frac{\rho_k}{\rho_{ref,k}} \right)^{0,5}$$

Where

$F_{v,Rk}$	shear resistance of the SHARP METAL connection installed in the side grain in N
$F_{v,eg,Rk}$	shear resistance of the SHARP METAL connection installed in the end grain in N
b	width of SHARP METAL with b = 50 mm
l_{ef}	effective length of the SHARP METAL with l_{ef} = min{0,9 l; l-10} in mm
ρ_k	characteristic value of the density of the timber member in kg/m³
$\rho_{ref,k}$	reference characteristic value of the density of the timber member $\rho_{k,ref}$=385 kg/m³
$f_{v,ref,k}$	characteristic value of the shear strength at the side grain as given in Table A4.1
$f_{v,eg,ref,k}$	characteristic value of the shear strength at the end grain as given in Table A4.1

Slip modulus $K_{v,ser}$

The slip modules for a SHARP METAL connection in the serviceability limit state (SLS) shall be calculated as

$$K_{v,ser} = b \cdot l_{ef} \cdot k_{ser}$$

With

$K_{v,ser}$	slip modulus of the SHARP METAL connection in N/mm
k_{ser}	bedding modulus of the SHARP METAL connection in N/mm³ as given in Table A4.1
b	width of the SHARP METAL with b = 50 mm
l_{ef}	effective length of the SHARP-METAL with l_{ef} = min{0,9 l; l-10} in mm

Table A4.1: Characteristic values of the shear strength and bedding modulus of timber members

Direction	Strength and stiffness properties			SHARP-METAL	SHARP METAL and screws HBS+HUS, TBS or TBSMAX 8 mm (ETA-11/0030)	
					a_1=175 mm	a_1=100 mm
Side grain	Shear strength	$f_{v,ref,k}$	[N/mm²]	0,81	1,02	1,72
	Bedding modulus	$k_{v,0,0,ser}$	[N/mm³]	1,76	2,47	3,05
		$k_{v,90,0,ser}$		0,72	0,87	1,01
End grain	Shear strength Solid timber	$f_{v,eg,ref,k}$	[N/mm²]		0,86	-
	Shear strength CLT				1,11	-
	Bedding modulus	$k_{90,0,eg,ser}$		-	1,40	-
	Solid timber and CLT	$k_{90,90,eg,ser}$		-	0,85	-